CLAIMS

1. A method for manufacturing horizontally continuously cast aluminum alloy rods, comprising:

a melting step of melting raw material for aluminum alloy to produce molten aluminum alloy;

a molten-metal treatment step of removing aluminum oxide and hydrogen gas from the molten aluminum alloy received from the melting step;

a horizontally continuously casting step of casting the molten aluminum alloy received from the molten-metal treatment step into horizontally continuously cast aluminum alloy rods;

a cutting step of cutting to a standard length the horizontally continuously cast aluminum alloy rods cast in the horizontally continuously casting step; a conveying step of conveying the cut, horizontally continuously cast aluminum alloy rods; a first straightening step of straightening bend of the conveyed, horizontally continuously cast aluminum alloy rods;

a peeling step of peeling skin portions of the straightened, horizontally continuously cast aluminum alloy rods;

a nondestructive inspection step of inspecting surface and internal portions of the horizontally continuously cast aluminum alloy rods having the casting surface portions peeled;

a sorting step of sorting horizontally continuously cast aluminum alloy rods judged non-defective based on results of the nondestructive inspection step; and

a packing step of packing the horizontally continuously cast aluminum alloy rods judged non-defective, with all steps being continuously performed.

2. The method according to claim 1, wherein an average temperature drop rate of the molten aluminum alloy is set to 15% or lower as measured between the melting step and the horizontally continuously casting step.

3. The method according to claim 1 or claim 2, wherein, in the melting step, tapping from a melting/holding furnace to the molten-metal treatment step is performed by a drop tapping method in which a surface of molten metal to be tapped is higher in level than a surface of tapped molten metal, or by a level-feed tapping method in which the surface of molten metal to be tapped is continuously connected to the surface of tapped molten metal.

4. The method according to any one of claims 1 to 3, wherein the melting step uses a plurality of melting/holding furnaces arranged in parallel in association with the molten-metal treatment step.

5. The method according to any one of claims 1 to 4, wherein, in the cutting step, at least one casting line in the horizontally continuously casting step is capable of being restarted.

6. The method according to claim 1, further comprises a heat treatment step of heat-treating the horizontally continuously cast aluminum alloy rods between the cutting step and the nondestructive inspection step.

7. The method according to claim 1, further comprises, between the conveying step and the first straightening step, an arraying step of arraying the horizontally continuously cast aluminum alloy rods by a conveyance method that combines conveyance of the rods in a lateral direction and conveyance of the rods in a longitudinal direction.

8. The method according to claim 1, wherein the nondestructive inspection step comprises a first nondestructive inspection step for surface inspection to control cutting conditions of the peeling step based on results of the first nondestructive inspection step and a second nondestructive inspection step for internal inspection to control casting conditions of the continuously casting step based on results of the second nondestructive inspection step.

9. The method according to claim 8, wherein the first nondestructive inspection step is performed by at least one method selected from among an eddy-current inspection method for detecting a surface defect of a horizontally continuously cast aluminum alloy rod by use of eddy current, an image-processing inspection method for detecting a surface defect of a horizontally continuously

cast aluminum alloy rod and a visual inspection method for visually detecting a surface defect of a horizontally continuously cast aluminum alloy rod, and the second nondestructive inspection step is performed by at least one method selected from among an X-ray inspection method for detecting an internal defect of a horizontally continuously cast aluminum alloy rod by use of X-rays and an ultrasonic inspection method for detecting an internal defect of a horizontally continuously cast aluminum alloy rod by use of ultrasonic waves.

10. The method according to claim 1, wherein the nondestructive inspection step combines internal inspection and surface inspection, the internal inspection is performed by at least one method selected from an X-ray inspection method for detecting an internal defect of a horizontally continuously cast aluminum alloy rod by use of X-rays and an ultrasonic inspection method for detecting an internal defect of a horizontally continuously cast aluminum alloy rod by use of ultrasonic waves, and the surface inspection is performed by at least one method selected from among an eddy-current inspection method for detecting a surface defect of a horizontally continuously cast aluminum alloy rod by use of eddy current, an image-processing inspection method for detecting a surface defect of a horizontally continuously cast aluminum alloy rod by means of processing an image of a surface of the horizontally continuously cast aluminum alloy rod, and a visual inspection method for visually detecting a surface defect of a horizontally continuously

cast aluminum alloy rod.

11. The method according to claim 1, wherein the nondestructive inspection step comprises a first nondestructive inspection step for inspecting surface portions of horizontally continuously cast aluminum alloy rods and a second nondestructive inspection step for inspecting internal portions of the rods, in which the first nondestructive inspection step comprises an encircling eddy-current flaw detection step to pass the rods through a probe and a rotary eddy-current flaw detection step to rotate the probe in a longitudinal direction of the rods, and further comprising a control step that comprises comparing a number of defects detected at the encircling eddy-current flaw detection step and the rotary eddy-current flaw detection step with a detection number judgment standard to obtain defect distribution groups, comparing the number of defects in each of the defect distribution group with a group judgment standard to obtain groups exceeding the group judgment standard and controlling, based on the groups exceeding the group judgment standard, molten-metal treatment conditions at the molten-metal treatment step, casting conditions at the horizontally continuously casting step and cutting conditions at the cutting step.

12. The method according to claim 1, wherein the nondestructive inspection step comprises a first nondestructive inspection step for inspecting surface portions of horizontally continuously cast aluminum alloy rods and a second nondestructive inspection step for

inspecting internal portions of the rods, in which the first nondestructive inspection step comprises an encircling eddy-current flaw detection step to pass the rods through a probe and a rotary eddy-current flaw detection step to rotate the probe in a longitudinal direction of the rods, and further comprising a control step comparing a number of defects detected at the encircling eddy-current flaw detection step and the rotary eddy-current flaw detection step with a detection number judgment standard to obtain defect distribution groups, comparing the number of defects in each of the defect distribution group with a group judgment standard to obtain groups exceeding the group judgment standard and controlling, based on the groups exceeding the group judgment standard, straightening conditions at the first straightening step.

13. The method according to claim 6, further comprising a binding step of binding the horizontally continuously cast aluminum alloy rods before the heat treatment step and an unbinding step of unbinding the bound rods after the heat treatment step.

14. The method according to claim 1, further comprising a binding step of binding the horizontally continuously cast aluminum alloy rods before the heat treatment step.

15. The method according to claim 14, wherein the horizontally continuously cast aluminum alloy rods are

stacked while supporting only opposite end portions of the rods.

16. The method according to claim 1, wherein the conveying step has a retention function for temporarily retaining the horizontally continuously cast aluminum alloy rods.

17. The method according to claim 16, wherein the retention function is such that the horizontally continuously cast aluminum alloy rods are conveyed laterally.

18. The method according to claim 1 or claim 6, wherein the conveying step uses a slat conveyor.

19. Equipment for manufacturing horizontally continuously cast aluminum alloy rods, used in the method according to any one of claims 1 to 18.

20. A horizontally continuously cast aluminum alloy rod manufactured by the method according to any one of Claims 1 to 18 or the equipment according to claim 19.

21. The horizontally continuously cast aluminum alloy rod according to claim 20, wherein it has a diameter of 20 mm to 100 mm.

22. The horizontally continuously cast aluminum alloy rod according to claim 20 or claim 21, wherein it

has a Si content of 7% to 14% by mass, an iron content of 0.1% to 0.5% by mass, a copper content of 1% to 9% by mass, a Mn content of 0% to 0.5% by mass and a Mg content of 0.1% to 1% by mass.